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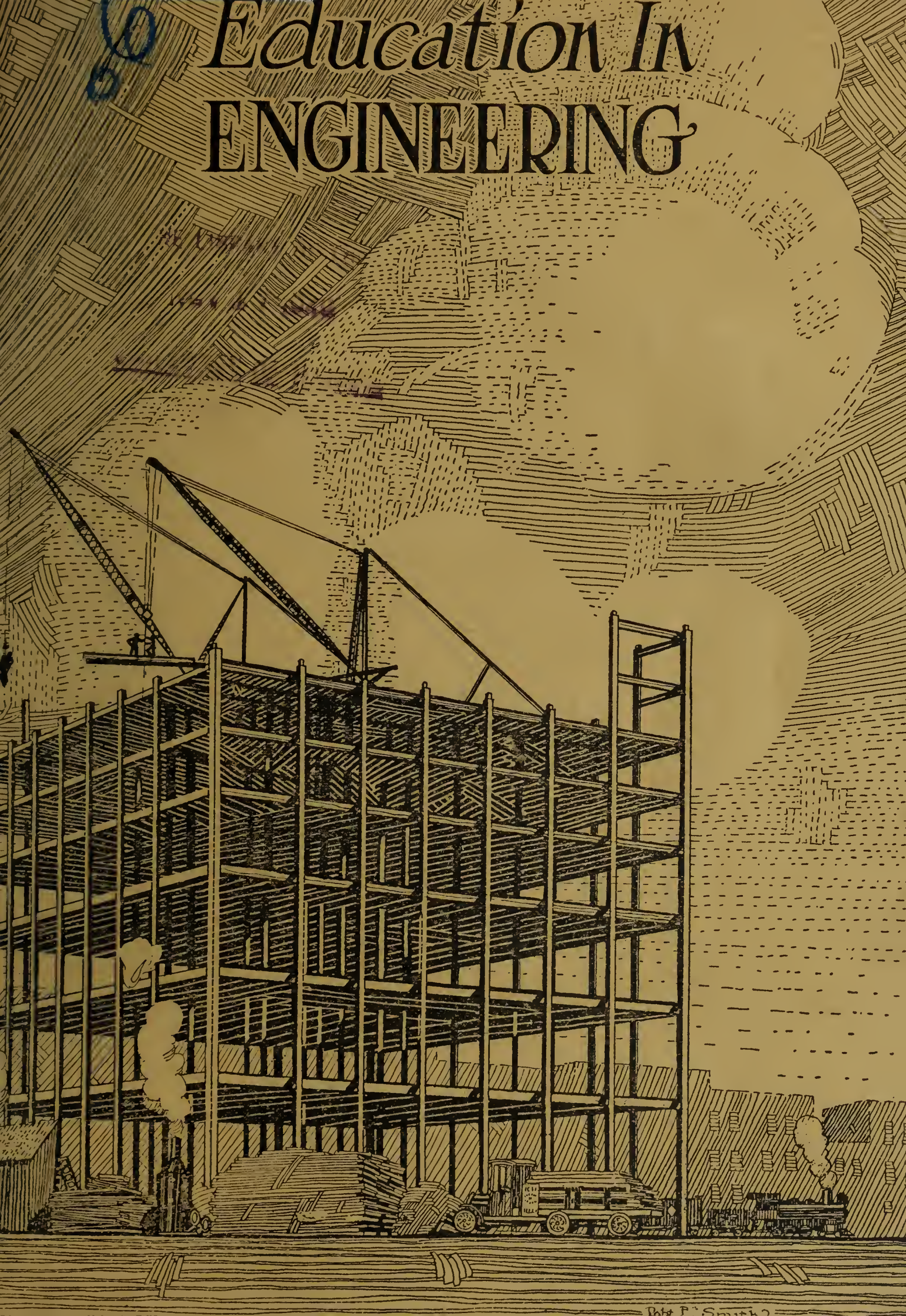
Education In
ENGINEERING



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EDUCATION IN ENGINEERING AT IOWA STATE COLLEGE

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ENGINEERING HALL AND STUDENTS OF THE ENGINEERING DIVISION

"The engineer of the new epoch, the epoch which he is bringing into existence thru the manufacture of power, must be an educated man."—Morison.

EDUCATION IN ENGINEERING

ENGINEERING and industrial expansion must go hand in hand. Engineering is indispensable to normal national growth. It is not surprising, therefore, to find that engineers are playing a large part in the present period of unprecedented industrial development. It seems likely that the nation will enjoy a healthy growth for many years to come and that during this period the engineer will do an important work in construcing and managing the facilities necessary for national life. For many years there has been a steady growth in engineering schools, and their graduates have readily found places in the industrial world. There will continue to be opportunities in the engineering field for ambitious young men who have a taste for the exact sciences that are the basis of engineering education, who possess imagination and initiative, and who are willing to subject themselves to the rigorous training necessary before they can gain a foothold in the engineering profession. As in many other professions there is always room at the top, altho there is at times an oversupply of mediocre engineers who are temperamentally unfitted for the engineering profession or who have been unwilling to apply themselves unremittingly to their work.

It is not surprising that there should be a steady demand for engineers when one considers that the practice of engineering is so closely related to economic progress. Engineering is an ancient profession, but its modern development began with the invention of gunpowder and the great mechanical inventions, the compass and the printing press. The achievements of engineering include the great network of steam and electric railways, the modern transoceanic steamship, electric light and power, the telephone, the telegraph, water supply and the sewerage systems, highways, irrigation systems, drainage systems for the reclamation of wet land, and the labor saving machinery which makes possible vast manufacturing and industrial enterprises.

THE ENGINEERING FIELD CONSTANTLY EXPANDS

The field of engineering is constantly expanding as modern civilization becomes more complete. Our complete community life demands conveniences made possible only by the work of engineers. The people are dependent upon the engineer for the safety of their lives. He plans and builds the public water supply systems; he controls the proper disposal of sewage to prevent the spread of disease; he directs the operation of telephone, electric and gas, light and power plants; he operates the many efficient public utilities such as urban, interurban and transcontinental railway systems, the telegraph and mail service, and thereby has eliminated time and distance in commercial and social life, and has made available to all the conveniences of modern civilization.

By adapting for use in rural communities the utilities which were first provided for cities, the engineer has made it possible for the farmer to enjoy practically all of the conveniences of city life. By the invention and perfection of labor--saving machinery the engineer has revolutionized the practice of farming and has thereby removed much of the drudgery which was once common to the life of the farmer.

Not only has the engineer been indispensable in the establishment of modern community life, but his services have been required in the growth of private industrial enterprises. Manufacturing interests, mining interests, farmers and the private citizen all require the engineer's services from time to time in the conduct of their affairs.

As the enterprises with which the engineer is identified have become more complex, the requirements for the engineer have become more exacting. There was a time when a young man who wanted to become an engineer traveled the road of apprenticeship and experience. That time is past. The exacting character of work of the engineer today demands that he receive that training in certain fundamental sciences and in established engineering practice, which can only come thru the college class room, shop and laboratory.

THE ENGINEER MUST BE AN EDUCATED MAN

George S. Morison, one of the most noted engineers of his day, in 1895 declared in an address given before one of the national engineering societies that the engineer of today must be an educated man. His keen appreciation of the demands of the future prompted him to predict that:

''The engineer of the new epoch, the epoch which he is bringing into existence by the manufacture of power, must be an educated man. In no profession will this be more necessary. The engineer cannot shield himself under doctrines or theories which he accepts but cannot understand. Dealing with accurate, definite laws, the education of the engineer will become more necessary, more thoro and more exact than that of any other professional man.''

For many years Iowa State College has been one of the recognized leaders in engineering education and no effort is spared

A GROUP OF ENGINEERING SHOPS AND LABORATORIES

"One of the indispensable means of increasing the efficiency of schools of technology is to provide well equipped laboratories of all kinds."

to maintain this high rank among engineering colleges of the country. At the present time its curricula include instruction in agricultural engineering, architectural engineering, ceramic engineering, chemical engineering, civil engineering, electrical engineering, mechanical engineering, mining engineering and trades and industries.

THE ENGINEERING COURSES AT AMES

The engineering courses at Iowa State College are arranged with a view to give that thoro technical training necessary for high grade professional engineering work. The purely technical subjects are given the necessary emphasis, but the instruction includes a sufficient amount of general work to secure that well balanced development which is necessary for the highest professional success. It is the aim not only to prepare a student to earn his bread and butter upon graduation, but to give him the foundation for a broad professional career, to make of him a well educated man and a good citizen.

The pure sciences, such as economic science, chemistry, physics and mathematics, are the foundation for engineering training, not only during the collegiate course but thruout a professional career. These sciences are given considerable emphasis in engineering courses because of the realization that without them the more advanced technical work cannot be successfully undertaken. In addition to these there are numerous technical subjects which contribute directly toward the special training of the engineer, and these subjects continue thruout the college course. No one should expect to be able during four years, which is so brief a part of a man's life, to master any one branch of engineering. The best he can hope to do is to secure a sufficient knowledge of the fundamental sciences and of the practice of engineering to enable him to get a start in engineering work. He must then continue his study of engineering along with his practice of the profession if he expects really to become an engineer in the broadest sense of the term.

THE EQUIPMENT AT AMES IS LARGE

To teach properly the fundamental sciences and the other technical courses that are usually included in an engineering training, the classroom work must be supplemented by laboratory and shop instruction and by engineering work in the field.

The standing of an engineering school will of necessity depend to a considerable extent upon its physical equipment. Iowa State College is extremely fortunate in that the state has here provided many buildings, shops and laboratories, and has furnished them with the best machines, apparatus and equipment. It is the aim of those responsible for the administration of the institution to maintain an engineering school second to none in the country. The state continues from year to year to provide liberal appropriations for enlargement, not only in buildings and equipment but in the teaching staff. There has recently been added to the equipment a splendid steam and gas laboratory. The transportation plant and laboratories built and equipped to afford instruction in railway engineering are the only ones of their kind west of the Mississippi.

In addition to the provisions for engineering education Iowa State College provides for four other major lines of education. In all it owns nearly 1600 acres of land of which 125 acres are in the campus proper, the remaining comprising the college and experiment station farms. Some 50 buildings now stand on the campus, and the total investment of the state at the College is approximately $6,000,000.

PRACTICAL TRAINING LINKED WITH THEORETICAL

It has already been noted that engineering studies must be supplemented by engineering practice. Because this is true, the college not only encourages students to secure engineering employment during their summer vacations, but some departments require such work before the completion of the course. Active touch with real engineering problems during the college course broadens the young man, gives him valuable experience thru contact with real engineering organizations, and fills him with enthusiasm for the profession which he is to follow.

Besides the regular studies of the courses, general technical lectures are given thruout the freshman year, and seminars during the remaining three years. There are meetings of the student engineering societies, lectures by prominent practicing engineers, active work on the students' monthly engineering journal, the Iowa Engineer, and other outside interests which are educational in themselves. Small indeed would be the value of physical equipment were it not for the body of highly trained specialists who form the engineering faculty at Iowa State College. All of the instructors are experts in their line and bring to the student not only a theoretical knowledge of the subjects they are teaching, but also the result of their practical experience in the outside world. Many of them are engineers of national reputation, respected in professional circles for their breadth and high technical ability.

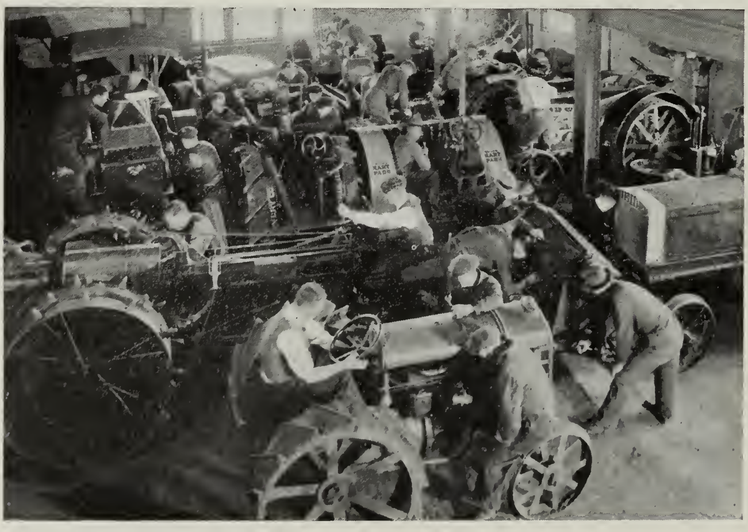
Best of all, the engineering faculty at Iowa State College is a teaching faculty. It means much to a young man to have frequent contact with men who are bigger and broader than the actual classroom work they are giving. These are the men who, thruout the four years of college life, help mould the lives of students in preparation for their work of service.

AGRICULTURAL ENGINEERING

AGRICULTURAL ENGINEERING is one of the newer branches of engineering. It applies engineering science and methods to the problems of agriculture and resembles in scope and purpose other branches of engineering identified with an industry, like mining engineering, for instance.

The high standard of living prevailing generally in American rural communities is largely due to the increased production of the farmer thru the use of mechanical equipment. Perhaps at no time in the history of American agriculture has there been a more rapid development of labor saving machinery than is taking place at the present time. The introduction of labor saving and comfort giving conveniences such as water supply, sewage disposal, heating and lighting systems, is going on rapidly.

Much more attention than formerly is being given to the design of farm buildings. There is a growing need for more substantial and permanent construction, and for careful planning



Agricultural engineering students have ample opportunity to study all types of gas engines and tractors.

Farm building design involves many nice problems which students work out in the drawing rooms.

so as to secure greater convenience, better lighting, more adequate ventilation and satisfactory sanitation.

The increased value of land has emphasized the importance of land reclamation and improvement thru land clearance, drainage and irrigation.

The Agricultural Engineering course includes thoro training in the fundamental subjects, general agricultural subjects, and specialized subjects in agricultural engineering. The course is planned to give a broad but thoro training in fundamental subjects rather than narrow specialization. Engineering problems in agriculture are of a wide variety, therefore the agricultural engineer needs a broad general training in engineering. It is also important that he be familiar with best farm practice.

The first degree in agricultural engineering was granted in 1910. Including the class of 1921, 118 men have graduated. Altho graduates of Iowa State College are in charge of the agricultural engineering work in twelve state agricultural colleges, the majority of the graduates have found places in industry with unusual opportunity for service. They are now engaged in:

1. Reclamation, development, improvement and management of farms where drainage, irrigation, land clearing, farm structures and the use of equipment are large factors.

2. Engineering and contracting for farm buildings, drainage and other farm improvements.

3. Work in the engineering, advertising and sales departments of commercial organizations making farm equipment.
4. Editorial work on farm, trade and technical journals.
5. College, experiment station, and government positions.

ARCHITECTURAL ENGINEERING

SPLENDID opportunities are opening up to the graduate in architectural engineering these days. Iowa especially is passing to an era of better buildings. In the rural field, for instance, the great strides toward better buildings can be no better illustrated than thru the statement of the fact that Iowa State College in the past two years has received thousands of requests for assistance in the building lines. It is predicted that Iowa will, within the next decade, take great steps toward becoming a manufacturing state. This means a demand for more and better factory buildings. The same conditions hold true over the entire country. People are demanding more livable dwellings, more modern structures of every kind. Such a demand, of course, produces an automatic demand for men trained to plan such structures.

Students in the architectural engineering course at Iowa State College are given a thoro training in the fundamentals of engineering problems found in connection with architectural work and a knowledge of the design and construction of all classes of structures not only from the standpoint of utility but also of appearance and economy. Only so much architectural design is taught as is required to enable the correct development of the engineering work and not enough to qualify for the practice of architecture.

The course prepares its graduates to become skilled draftsmen in any line of building and construction work, to qualify for positions of building inspector or superintendent or to become general contractors and consulting architectural engineers. The field is a broad one and the opportunities are real for young men who take the course.

Such subjects as masonry, steel and reinforced concrete construction are carefully studied so as to allow the student to become familiar with the latest methods and best practices of computation. Practice work in testing materials in cement and masonry laboratories is fully developed to enable the student to become familiar with the structural properties of building materials.

The technical work is supplemented by cultural subjects to give the student a broad and developed point of view.

Architectural engineering students are given fundamental instruction in art principles.

Fine, well lighted drawing rooms are provided for the study of architectural design.

CERAMIC ENGINEERING

Students in ceramic engineering are required to study methods of large manufacturing plants.

A CERAMIC engineer is a man or woman who can handle problems in those arts and industries that use clay, sand and modifying substances in whole or in part as raw material. The field of usefulness extends from the point of origin of the raw material to the desk of the highest executive. The job a ceramic engineer may hold depends on the engineer. The pay varies from that pay usually commanded by unkown engineers to that commanded by well known engineers of any branch of engineering. The only question a prospective student need consider is that of whether or not there is pleasure for him in the work of ceramic engineering. It is a useful and noble thing to be a ceramic engineer, exactly as it is to be any other useful person.

Ceramic engineers are essential in those industries that manufacture glass, pottery, tile, brick, sewer pipe, paving brick, abrasive wheels, enameled metals, cement, spark plugs, electrical porcelain, refractories and false teeth. Anything that can be made from clay, glass, or sand is a ceramic product. Civilization pays toll to ceramic skill at every turn; the history of mankind has been largely written by ceramic engineers.

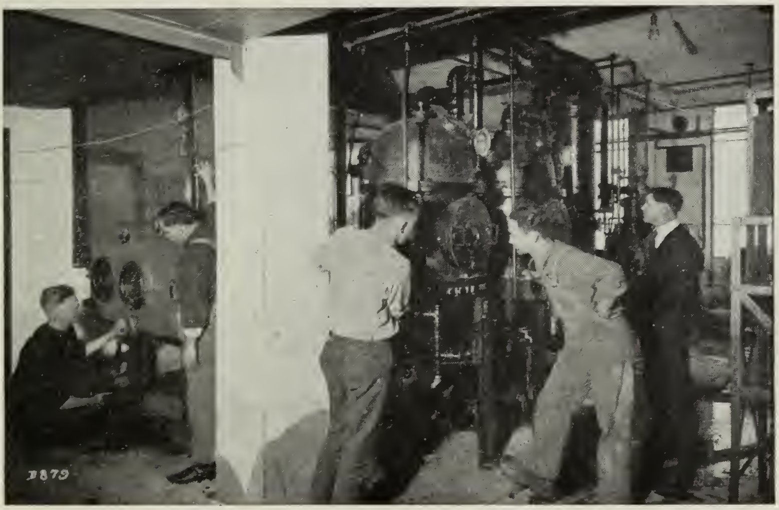
Culturally the field of ceramic engineering is of interest. Literature is filled with reference to things ceramic engineers under other names have done. The Bible is the source of information for the first item of the history of ceramics and Homer sang of the ceramist. We know more of the story of the kingdoms of that land that was once called Eden than we otherwise would have known because the story was told on burned clay. Human beings love clay as they love no other material that civilization uses. The poets of all ages have told of the use of clay.

The field of ceramics is one that can satisfy the artist, the mechanic, the inventor, the research investigator and the great executive. It has grown with the growth of civilization and is so essentially a part of civilization that no student can make a mistake in the choice of this profession, provided the work appeals to him as work both interesting and useful. To be a ceramic engineer is to contribute in good citizenship exactly as is the case with all useful fields.

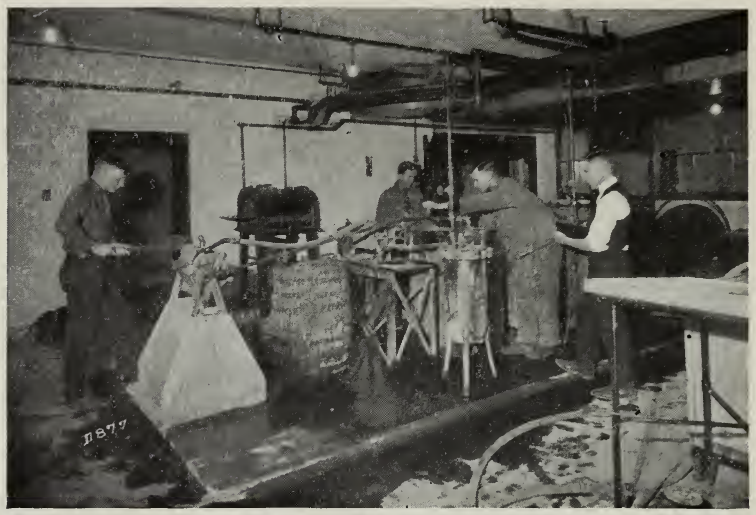
CHEMICAL ENGINEERING

THE growth of the chemical industries has been phenomenal in recent years. From the standpoint of wealth produced they now rank third among the American industries; and they are among the world's strongest and best financed industries.

Of especial importance to this section of the country is the group of industries which are elaborating farm products. Artificial fats, starch, glucose, corn syrup, dextrine, slaughterhouse by-products, corn oil, soaps, glycerine, straw board and a host of other products are all being produced, at the present time, in large chemical plants. In all of these the call for chemical



Observing an important stage of chemical manufacture in the laboratory.



This and other chemical engineering laboratories are complete in their equipment.

engineers is urgent. Water purification, sewage disposal and sanitation in general, demand their quota of trained men.

The older chemical industries which manufacture such products as acids and alkalis, fertilizers, by-product coke and coal tar are expanding greatly. Added to this list is a large group of industries such as laundries, bakeries and confectionaries which have found the chemical engineer a valuable adjunct.

Since the recent war an effort is being made to render America chemically independent of European countries. As a result products which were previously imported, such as dyes, potash and fine chemicals, are being produced, in large quantities, in domestic plants. Of especial importance is the fixation of atmospheric nitrogen for use in explosives and fertilizers.

The course at Iowa State College gives a thoro grounding in chemistry, physics, mathematics and graphics, and also a comprehensive training in engineering. In the class room the theory of the operations used in the industries is taught. In the laboratory the student is given practice in actual elaboration of raw materials, using machines similar to those used in the chemical industries. Investigations pertinent to chemical engineering are also carried out. Courses are given in the design of chemical machinery and plants.

The equipment of the college is quite complete. The laboratory machinery is so selected as to illustrate practically every type of operation carried out in the chemical industries.

CIVIL ENGINEERING

CIVIL ENGINEERS deal with the design and construction of engineering works which are usually at rest. These include the highways and railroads which make it possible to travel readily from place to place; water supply and water purification plants providing the ever necessary water of suitable quality; sewerage systems and sewage disposal plants to remove the various wastes before they become a menace to health; hydraulic power plants which are becoming all the more necessary to conserve fuel and to provide the power, which may be transmitted electrically wherever it may be needed; huge dams and water conduits to collect and distribute the water for power and domestic uses; gigantic bridges to provide crossings of large rivers and multitudinous moderate sized and small ones to bridge the lesser streams; the frame work of sky scraper buildings; the piers and docks to provide a safe and convenient place for the loading and unloading of ocean steamships; sea walls such as have been necessary to save some of our large cities, notably Galveston, from the fury of the waves; and a great many other things which are needed to provide for our wants and appeal to our sense of fitness.

While the civil enginéer concerns himself primarily with the construction of useful things he does not lose sight of the fact that he should make his structures so pleasing in appearance that in providing for the needs of man he, at the same time ap-

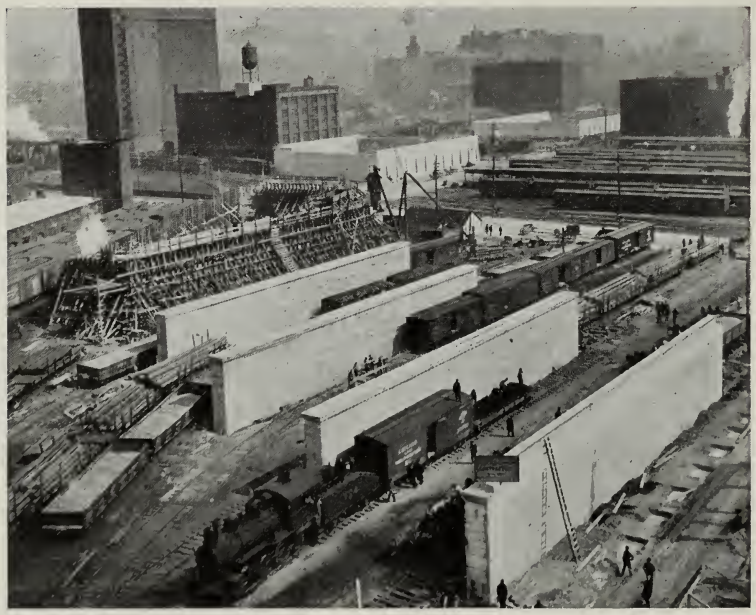
Civil engineering students secure summer appointments on important state road building projects.

peals to his better nature and helps to develop a higher citizenship.

Thruout all the civil engineer's works is woven a thread of surveying which is usually interesting and frequently romantic. These works are accompanied, too, by a great amount of drafting and computations which may seem like drudgery or inspiration, according to how one gets into the spirit of what he is helping to build.

The civil engineer will not content himself with design and construction, however fascinating they may be, but finds his way into business where a knowledge of engineering is essential and eventually into the management of commercial enterprises. A comparatively recent field of great promise is that opened up to engineers as city managers of the rapidly increasing number of cities which are placing the control of engineering interests under one responsible head.

Civil engineering has no place for the drone or the sluggard but offers untold interest and inspiration for those of ability who catch its spirit. Iowa State College plans its course to give the groundwork for the highest conception of the profession.



This great piece of terminal construction was designed and directed by an Iowa State alumnus.

ELECTRICAL ENGINEERING

Extensive electrical equipment is provided for the work in electrical engineering.

TO any young man interested in that sort of work electrical engineering opens a wide field. After completion of the course at Iowa State College and a reasonable time in practical work, graduates are qualified for the position of chief operators of power plants; superintendents of construction; managers of railway, lighting or telephone properties; designers; sales engineers; consulting engineers and many other professional positions requiring training and responsibility. Manufacturing companies employ many hundred of new electrical engineering graduates every year.

During the first two years of the course, the studies consist of the fundamental sciences, mathematics, physics, chemistry and English. In the third year are given courses in economics and engineering English and a course in mathematics especially designed for the electrical engineer; in the fourth year come more highly specialized studies and the application of electricity to power and lighting, including transmission lines and electric railways. Courses are also given in telephone engineering, wireless telegraphy and the use of electricity on the farm.

Electrical equipment at Iowa State College is complete in every detail. For experimental purposes there are all varieties of generators, motors, transformers, precision instruments, mounted lamp banks, rheostats, choke coils and all other electrical apparatus to constitute a complete laboratory. An unusually complete telephone equipment forms part of the outlay. One of the largest college wireless stations in the country is operated by the college.

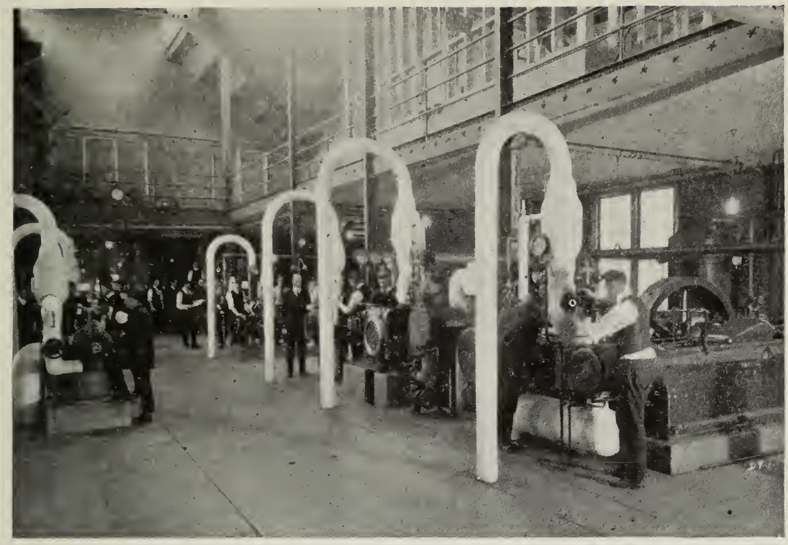
Illuminating engineering is of particular interest to the electrical engineer. The work in this branch is handled by the physics department in close cooperation with the department of electrical engineering. Three special laboratories are equipped with all the latest and most improved lighting fixtures and illumination testing apparatus.

MECHANICAL ENGINEERING

DUE to the great industrial and manufacturing development of the country, the field of the mechanical engineer is constantly being widened and extended. In addition to designing and building machines and mechanical appliances of all kinds, he is now being called to positions of great responsibility with public utility, manufacturing and construction interests.

The growth of such interests depends much upon the use of

All mchanical engineering students secure thoro training in machine shop practice.



All modern types of steam and gas engines are found in this laboratory.

labor saving and cost reducing machinery and for handling the product efficiently. And it is to this field that the mechanical engineer is receiving an insistent call. His knowledge of natural laws and sciences combined with his training to do independent thinking give him a valuable foundation for an industrial career.

Instruction in mechanical engineering at Ames has been planned to keep pace with the development of the profession. It is a broad training course in the fundamentals supplemented by applications in mechanical engineering. The recitation and lecture courses are not given primarily for the purpose of supplying the student with a fund of facts and statistics but to develop logical thinking.

The work in the shops and drawing rooms is arranged to give to the student instruction in materials of construction, the design, operation and management of the more common machine tools, and to impress upon him the necessity of care and accuracy in design and construction.

The steam and gas laboratory is completely equipped with a great variety of apparatus peculiarly adapted to investigation and research. The laboratory work is most practical.

Fundamental courses in business engineering are required to develop the industrial and commercial side of the engineer's training.

For several years the demand for mechanical engineering graduates has greatly exceeded the supply. A majority of the men in each year's senior class are placed before graduation. The rate of promotion and advancement then depends almost entirely upon the man himself.

In addition to the fundamental courses in economics and accounting required of all mechanical engineers, the student is permitted to elect a group during his senior year which has for its purpose the training of the business engineer, competent to serve as organizer, sales manager and manager of industrial concerns. The Federal Government thru the Bureau of Education and its technical departments, is lending its influence to promote the movement.

MINING ENGINEERING

IT may fairly be claimed that a well balanced course in mining engineering gives one of the broadest engineering educations possible. The well grounded mining engineer is fitted to specialize in many directions. The course in mining engineering is sometimes taken by students desiring a course in general science.

Not only are mining engineers concerned with the sinking of shafts and the transporting of ore to the surface, but also with the processes for separation of ore, smelting, milling, drainage and ventilation of mines; disposal and utilization of mine refuse; production of metals and their preparation for particular uses.

An interior coal mine scene in Iowa.

Field trips afford students a study of mine operations.

The mining engineer may direct his attention to geology and become a mining geologist. He may go into the metallurgical field. He may become a metallographer, a man who deals with metals and their structure. This is called the "age of steel"; in fact the metallographer has made it the age of alloys. As the present price of metals is unusually high, trained metallurgists are in greater demand than before the war.

The United States stands at the head of the list in the production of metals. This is not only due to the richness of our ores, but also to the skill of our engineers in making them available. Fifty years ago students traveled to Europe to study mining, now they are coming to the United States.

Hand in hand with high metal prices will come big improvements in metallurgical methods. The trained metallurgist is fast coming into his own. For instance, thru the discovery of one new process by a metallurgist one large concern has modified its plant to make 50,000,000 pounds more of copper annually with the same tonnage of ore and at a decreased cost.

The increased price of coal has resulted in many companies calling in engineers to help them install systems for extracting all the coal in the ground. This is being done by companies that have been careless about extraction heretofore.

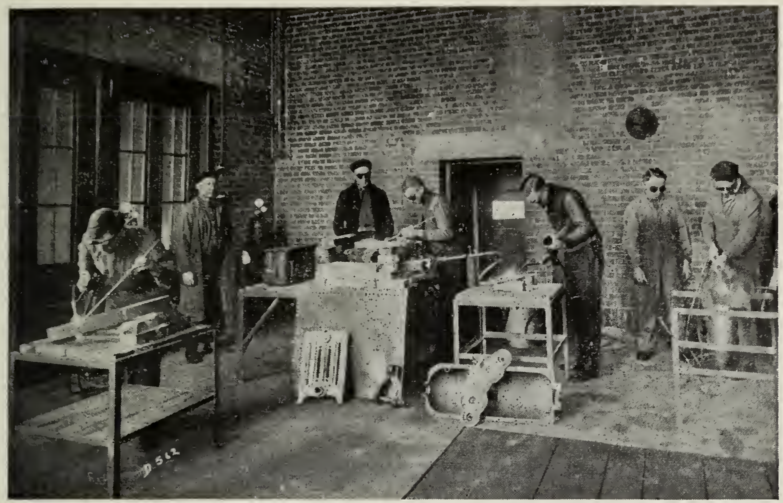
The opportunities for the technically trained mining engineer in solving problems of the small mines are big. Heretofore these mines have had little technical skill at their disposal. Now, with a favorable disposition of capital toward mining a young mining engineer of business ability can find ample reward in acquiring control and managing these heretofore neglected properties. Another broad field is that of manufacturing mineral chemicals.

COURSES IN TRADES AND INDUSTRIES

THE group of courses in trades and industries consists of a four-year collegiate course, special two-year courses and several of less duration.

The collegiate course in trades and industries is intended: first, to develop really high grade teachers of technical and industrial subjects and also administrators in industrial schools, especially those established under the Smith-Hughes act; second, to give the student not only marketable skill in one or more lines but to develop that broad grasp of modern industry which may qualify him to assume, in due time, an important place of leadership in it. A large part of the course is very similar to the standard engineering courses and the common subjects are offered in the same classes. The principal difference lies in the omission from the trades and industries course of the specialized technical subjects peculiar to a course in engineering. All those fundamental subjects which tend to develop the powers of reasoning for the regular engineering student are also present for the student in trades and industries. In addition, the course includes particularly strong practical subjects in machine and wood-shop work, drafting, automobile practice and vocational

Practical courses in drafting are provided for trades and industry students.



Students in trades and engineering doing oxy-acetylene welding.

education. Should a student later desire to take a degree in engineering he may do so with about one year of extra work.

The two year courses consist of an electrical course, a mechanical course and a structural course. They are very practical and are established for the benefit of those who want to make the most of their abilities with a limited education. These courses are not intended for men who can complete one of the four-year courses in engineering nor are they intended to serve as a training for professional engineers. Their main purpose is to make available for earnest, enthusiastic young men of mature habits, a training which will help them to increase their usefulness and earning capacity and prepare them for responsible positions with the industries. Men who conscientiously pursue these courses to completion may eventually fill positions such as head draftsmen, foremen in shops and factories, superintendents of power plants and contractors.

The one year course and the twelve week course in automobile mechanics are among the most popular courses of the trades and industries group. The number of students enrolled in automobile work has taxed the facilities of a large building, 80 by 200 feet. The complete course includes instruction on engine adjustment and repair, carburetion, ignition, starting and lighting, storage battery, oxy-acetylene welding and machine shop work for automobile repairs. The instruction is of the most practical kind. Floor work is at a maximum while formal class room instruction is at a minimum.

A special twelve week course for draftsmen is another important practical course of instruction, particularly for those already engaged in commercial drafting. A student may arrange to specialize in architectural, mechanical, civil or structural drafting. The work is conducted as nearly as possible to reproduce the type of work demanded in industry. Students with no previous training may become practical draftsmen after taking three terms of twelve weeks each.

All of the two-year and shorter courses are open to anyone seventeen years of age and with at least an eighth grade education or its equivalent. A high school graduate is not eligible for entrance to a two year course but he may enroll in either an automobile or drafting course.

Practical work in concrete manufacture.

The College

The Iowa State College of Agriculture and Mechanic Arts conducts work along five major lines:

Agriculture Home Economics
Engineering Industrial Science
Veterinary Medicine

The Graduate Division conducts advanced research and instruction in all these five lines.

Four, five, and six year collegiate courses are offered in different divisions of the College. Non-collegiate courses are offered in agriculture, home economics and trades and industries. Summer sessions include graduate, collegiate and non-collegiate work. Short courses are offered in the winter.

Extension courses are conducted at various points thruout the state.

Research is conducted in the Agricultural and Engineering Experiment stations and in the Veterinary research laboratory.

Special announcements of the different branches of the work are supplied, free of charge, on application.

Address The Registrar,
Ames, Iowa.

Summer Session

THE summer session at Iowa State College fits the needs of several classes of students. June graduates of high schools and secondary schools may begin freshman work and gain a quarter on the time required for a full course. College students may make up back work, secure additional credits, or do work along special lines. Graduate students may carry work to count toward an advanced degree. Superintendents, principals and high school teachers may secure additional knowledge and training along special lines, particularly in the industrial and vocational subjects. The strong rural teachers may secure special help in agriculture, manual training and home economics. The summer session also offers opportunity for recreation and special lectures to those who are not teachers or college students.

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